



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/387,857	09/01/1999	FUMITAKA SUGAYA	1776/00039	3099

7590 11/10/2003  
POLLOCK VANDE SANDE & PRIDDY  
P O BOX 19088  
WASHINGTON, DC 200363425

EXAMINER

NOVACEK, CHRISTY L

ART UNIT PAPER NUMBER

2822

DATE MAILED: 11/10/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application N .

09/387,857

Applicant(s)

SUGAYA, FUMITAKA

Examiner

Christy L. Novacek

Art Unit

2822

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 11 August 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 28-36, 38-42, 44 and 45 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 28-31, 38-42, 44 and 45 is/are allowed.
- 6) ☒ Claim(s) 32-36 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11 August 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☒ Certified copies of the priority documents have been received in Application No. 09/059,590.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

### **DETAILED ACTION**

This Office Action is in response to the amendment filed May 6, 2003 and the response filed August 11, 2003.

#### ***Drawings***

The corrected drawings received on September 4, 2003 are acceptable. The objection to the drawings is withdrawn.

#### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 32-35 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. As amended, claim 32 (lines 14-15) recites the limitation of etching the first conductive film "until said first opening divides said first conductive film in said first opening below said second opening above said isolation structure". The specification does not support the limitation of dividing the first conductive film in the first opening below the second opening.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 36 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 36 (lines 7-11) recites the limitations "dividing said first conductive film conforming to a shape of one of said openings so as to reach said insulating film region, forming a cylindrical hole below said second opening in which a surface of said insulating film region is exposed, and simultaneously forming at least one recess in a surface of said divided first conductive film conforming to a shape of the other opening". These limitations are confusing and unclear because the claim language seems to be describing three different openings: one which reaches the insulating film region, a second one which forms a cylindrical hole exposing the surface of the insulating film region, and a third one which forms a recess in the first conductive film. However, lines 4-5 of the claim describes the mask as "having two openings of different dimensions." In addition, lines 8-9 of the claim recite the limitation of "said second opening", but there is insufficient antecedent basis for this limitation in the claim.

### ***Claim Rejections - 35 USC § 102***

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 32-34 are rejected under 35 U.S.C. 102(e) as being anticipated by Schoenfeld et al. (US 6,010,932, previously cited).

In reference to claims 32 and 33, Schoenfeld discloses forming an element active region and an element isolation structure (104) on a semiconductor substrate (102) (Fig. 1; col. 4, ln. 19-23). A gate oxide film (106) and a gate electrode (116) are formed in the active region and an

Art Unit: 2822

impurity is doped into the substrate in the active region to form a pair of impurity diffusion layers (108/110) in the surface of the substrate on two sides of the gate electrode (Fig. 1; col. 4, ln. 23-31). An insulating interlayer film (120/126) is formed on the entire surface of the substrate. A hole is formed in the insulating interlayer film such that one of the impurity diffusion layers is exposed. A first conductive film (128) film is deposited onto the insulating interlayer film such that it fills the hole in the interlayer film and is electrically connected to one of the impurity diffusion layers (col. 4, ln. 55-58). A mask pattern (130) having first (142) and second (140) openings is formed on the first conductive film and the mask is used to divide the first conductive film below the first opening while simultaneously forming a recess in the first conductive film below the second opening such that the first conductive layer forms a bottom of the recess (Fig. 2-3; col. 4, ln. 61-col. 5, ln. 15). A dielectric film (134) covers the surface of the first conductive film and a second conductive film (136) covers the dielectric film (Fig. 4; col. 5, ln. 16-21).

In reference to claim 34, Schoenfeld discloses that the second openings (142) may be of any size so long as the width of the first openings (142) greater than the width of the second openings (140) (col. 4, ln. 66-col. 5, ln. 15). Specifically, Schoenfeld states, "It is, of course, understood that the apertures 140 can be of any shape (circular, triangular, rectangular, etc.), size, and/or dimension to achieve a desired surface area on the storage poly nodes 132." (col. 5, ln. 11-15)

### ***Claim Rejections - 35 USC § 103***

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim 35 is rejected under 35 U.S.C. 103(a) as being unpatentable over Schoenfeld et al. in view of Wolf (Vol. 2, previously cited).

In reference to claim 35, Schoenfeld discloses that the second opening of the mask pattern is positioned above the element active region (Fig. 2). Schoenfeld does not disclose planarizing the first conductive layer by polishing. Wolf (Vol. 2) discloses that when photolithography is used to pattern IC features, it is required that the imaging surface to be etched is very flat in order to obtain the maximum resolution from the photolithography etching process (last paragraph pg. 65, pg. 203). The Examiner takes official notice that chemical mechanical polishing is a well-known and conventional method in the art for providing planarization of films. At the time of the invention, it would have been obvious to one of ordinary skill in the art to planarize the first conductive layer of Schoenfeld because, as Wolf teaches, it is required that an imaging surface be planar when it is to be subjected to a photolithographic process in order to achieve the maximum resolution from the etching process. Furthermore, it would have been obvious to one of ordinary skill in the art to conduct the planarization using a polishing technique because it is a conventional method of planarization.

### ***Response to Arguments***

Applicant's arguments filed May 6, 2003 have been fully considered and they are persuasive in part.

In reference to claim 38, Applicant argues that Komori does not disclose the claim limitations of forming a cylindrical hole through the first conductive film below the second opening. The Examiner agrees with this argument.

Art Unit: 2822

In reference to claims 32 and 36, Applicant argues that these claims are allowable over the prior art because each of the claims, “now recites the fact that a cylindrical opening is etched in the semiconductor which extends below the second opening.” However, claim 32, as amended, does not recite anything about a “cylindrical opening” and claim 36, as amended, does not make any sense.

***Allowable Subject Matter***

Claims 28-31, 38-42, 44 and 45 are allowed.

***Conclusion***

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christy L. Novacek whose telephone number is (703) 308-5840. The examiner can normally be reached on Monday-Thursday and alternate Fridays 7:30 - 5:00.


Art Unit: 2822

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on (703) 308-4905. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

CLN

November 4, 2003



**AMIR ZARABIAN**  
**SUPERVISORY PATENT EXAMINER**  
**TECHNOLOGY CENTER 2800**